EFFECT OF AUTOMOBILE POLLUTION ON PLANTS IN NARNAUL CITY, HARYANA

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Abstract: *Air pollution is one of the major problems in the world. It is influenced by four major factors, such as industrialization in the cities, increase in traffic, rapid economic development, and higher level of energy consumption. The growth of both an industrial and residential area is unplanned in many developing cities of India, thus, it contributing to the air pollution problems. In urban areas, the mobile or vehicular population is predominant and significantly contributes to air quality problems. In recent past, air pollutants, responsible for vegetation injury and crop yield losses, are causing increased concern. Air pollution is one of the serious problems in the world, its facing today. It deteriorates ecological condition and can be defined as the fluctuation in any atmospheric constituent from the value that would have existed without human activity .It has been observed that plants particularly growing in the urban areas affected greatly due to varieties of pollutants (oxides of nitrogen and sulphur, hydrocarbon, ozone, particulate matters, hydrogen fluoride, peroxyacyl nitrates (PAN) etc.) .Chlorophyll is found in the chloroplasts of green plants and is called a photoreceptor. Chlorophyll itself is actually not a single molecule but a family of related molecules, designated as chlorophyll "a", "b", "c" and "d". Chlorophyll "a" is the molecule found in all plant cells and therefore its concentration is what is reported during chlorophyll analysis .Chlorophyll is an index of productivity of plant. Whereas certain pollutants increase the total chlorophyll content, others decrease it. The leaf epidermis is the first target of air pollution as the pollutant first passes through the stomata where most of the gas exchange takes place through these small pores on the exposed surfaces.*

Key Words: *Chlorophyll, crop yield, leaf epidermis, Road side pollution; urban trees etc.*

1. INTRODUCTION:

Motor vehicles account for the world's air pollution more than any other human activity. They are responsible for virtually all of the carbon monoxide and lead in the air of cities, and a major portion of the NOx, VOCs (Volatile organic compounds), fine particles, and toxic chemicals . The transport system of Narnaul city consists on buses, minibuses, trucks, wagons, vans, Suzuki, auto rickshaws and motor cycles. Faulty and badly maintained automobile vehicles release carbon particles, unburned and partially burned hydrocarbons, tar materials, lead compounds and other elements in the environment due to incomplete combustion of fuel which are the constituents of petrol and lubricating oils deposited on the surface of plants. These pollutants in combinations cause greater or synergistic effects to plants growth. The deposition of trace elements, gaseous pollutants, nitrogen oxides (NO_x), carbon monoxide (CO), carbon dioxide (CO_2), sulfur dioxide (SO_2) on the leaves affected their physiological behavior.In last couple of decades, it has been observed with great concern that the density of vehicles in the city of Narnaul have increased enormously. Many adverse effects of automobile pollution on plants growing along the busy roads have been observed. The nature of harmful effects can vary to some extents, depending on the pollutant and tolerance of the species. Chlorophyll is the green molecule in plant cells that carries out the bulk of energy fixation in the process of photosynthesis. In photosynthesis, sunlight is absorbed by chlorophyll. Actually, chlorophyll itself is not a single molecule, but a family of related molecules designated as chlorophyll a, b, c and d. Chlorophyll plays a crucial role in photosynthesis . Pollution from automobiles normally comes from engine fumes, due to incomplete burning of fuel. It is well known that air pollution represents a threat to both the environment and human health, and it is estimated that millions of tons of toxic pollutants are released into air each year. Chlorophyll catabolism not only affects the key components of a plant's photosynthesis systems, but it is also responsible for the green color of leaves and fruits and therefore, it plays an important role in plant development.

2. REVIEW OF LITERATURE:

Ozone pollution, as a causal agent of plant damage was first identified in the India. A new type of injury was detected on plants in the 1940s. It was initially described as "weather fleck", and led to premature senescence in

tobacco. In 1958, ozone was shown to be the causal agent of "weather fleck" in tobacco. Since then, numerous exposure experiments have been conducted in the india in the 1970s and 1980s as part of the National Crops Loss Assessment Network (NCLAN) and in Europe in the late 1980s and early 1990s as part of a European initiative to explain crop losses caused by ozone . Ozone is now considered to be the most important phytotoxic air pollutant in the india and Europe.In the rapidly industrializing countries of Asia, Africa and Latin America, equally rapidly rising emissions of gaseous and particulate pollutants have become a cause of concern in the last two decades. Although impacts on human health are of highest priority, recent surveys and studies have indicated that effects on vegetation are widespread with sulfur dioxide and ozone being identified as the gaseous pollutants causing the most damage.

3. MATERIAL AND METHOD:

Before a pollutant can cause damage, it must first come into contact with the plant. Pollutant uptake (or flux) is dependent on climatic conditions since these influence both the atmospheric conductivity of the pollutant and the receptivity of the plant by an effect on stomatal aperture (i.e. on how wide open the stomatal pores are on the leaf surface). The nature and extent of damage to plants then depends on the chemistry and physical characteristics of the pollutant being considered, and on the plant's ability to detoxify the pollutant. The fresh leaves were collected plants, brought to the laboratory Amount of chlorophyll present in the extract in mg chlorophyll per gram of leaf tissue can be calculated by following equation.

mg of Chlorophyll-a/ g tissue = $12.7(A_{663})$ - $2.69\ (A_{645})$ x V / 1000 x W mg of

Chlorophyll-b/ g tissue = $22.9(A_{645})$ - $4.68\ (A_{663})$ x V / 1000 x W mg total

Chlorophyll / g tissue = $20.2(A_{645})$ - $8.02(A_{663})$ x V / 1000 x W

Where,

A= Absorbance at specific wavelengths
V= Final volume of chlorophyll extract in 80 % acetone
W= Fresh weight of tissue extracted

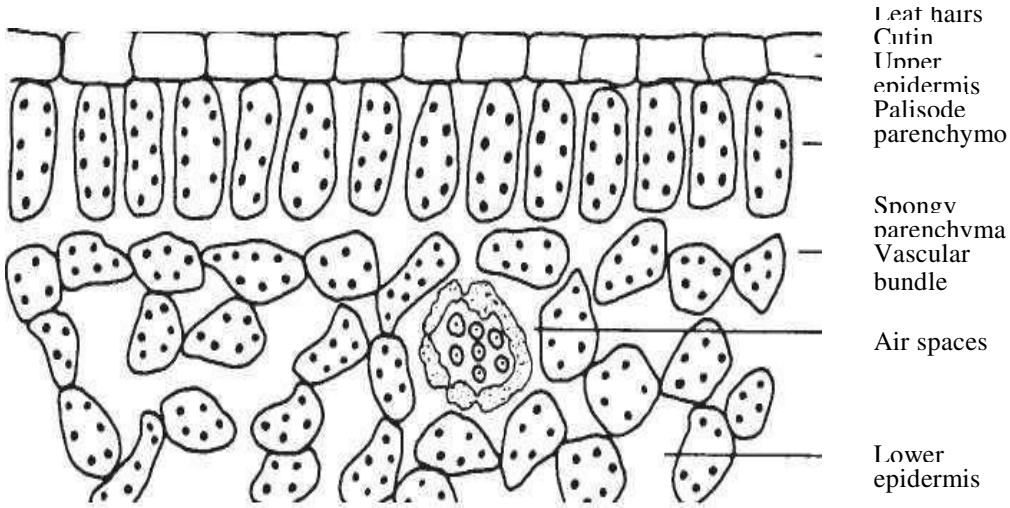

Fig. 1.1 Cross section of leaf showing various components

Air pollutants may enter plant systems by either a primary or a secondary pathway. The primary pathway is analogous to human inhalation Fig. 1.1 Shows the cross section of a leaf. Both of the outer surfaces are covered by a layer of epidermal cells, which help in moisture retention. Between the epidermal layers are the mesophyll cells-the spongy and palisade parenchyma. The leaf has a vascular bundle which carries water, minerals, and carbohydrates throughout the plant. Two important features shown in Fig. 1.1are the openings in the epidermal layers called stomates, which are controlled by guard cells which can open and close, and air spaces in the interior of the leaf. The leaf structure has several important functions, three of which are photosynthesis, transpiration, and respiration.

4. DISCUSSION:

Human activities directly or indirectly affect the environment adversely. A stone crusher adds a lot of suspended particulate matter and noise into the atmosphere. Automobiles emit from their tail pipes oxides of nitrogen, sulphur dioxide, carbon dioxide, carbon monoxide and a complex mixture of unburnt hydrocarbons and black soot which pollute the atmosphere. These are only a few examples which show how human activities pollute the

environment. Pollution may be defined as addition of undesirable material into the environment as a result of human activities. The agents which cause environmental pollution are called pollutants. A pollutants may be defined as a physical, chemical or biological substance unintentionally released into the environment which is directly or indirectly harmful to humans and other living organisms. Air pollution is a result of industrial and certain domestic activity. An ever increasing use of fossil fuels in power plants, industries, transportation, mining, construction of buildings, stone quarries had led to air pollution. Air pollution may be defined as the presence of any solid, liquid or gaseous substance including noise and radioactive radiation in the atmosphere in such concentration that may be directly and indirectly injurious to humans or other living organisms, plants, property or interferes with the normal environmental processes. Air pollutants are of two types (1) suspended particulate matter, and (2) gaseous pollutants like carbon dioxide (CO_2), NOx etc.

5. CONCULSION:

The effect of automobile pollution on chlorophyll content (chlorophyll "a", chlorophyll "b", chlorophyll "a+b") for different tree species growing at different polluted sites of the city as compared to the control site was determined. All the species showed a decrease in chlorophyll content as compared to sample collected from the control site. The highest effects were recorded in the leaf sample collected from the Road side tree . It was concluded that autovechicular exhaust emission significantly affected ($p<0.05$) the concentrations of chlorophyll "a", chlorophyll "b" and total chlorophyll "a+b" . . Hence, concluded that, the vehicles gases are acted as an air pollutant for the plants leaves.

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